

AMENDMENTS TO THE CLAIMS

Claims 1 - 4. (Cancelled)

5. (Currently Amended) An optical switch provided with N number of input ports and N number of output ports (herein "N" is a plural number), comprising:

N number of first switching parts each having one input port of the N number of input ports and N number of first coupling ports;

N number of second switching parts each having one output port of the N number of output ports, N number of second coupling ports; and

N X N number of optical fibers connecting the first coupling ports and the second coupling ports, wherein

P_{1i} each of half the number or more of first coupling ports the N X N first coupling ports are connected with second coupling ports P_{2(N+1-i)}, where P_{1i} is a first coupling port corresponding to an optical path which comes in the "i"th shortest one in terms of the optical path length between the input port and one of the first coupling ports in each first switching part, and P_{2j} is a second coupling port corresponding to the "j"th shortest one in terms of the optical path length between the output port and one of the second coupling ports in each second switching part ~~An optical switch as defined in claim 4~~, wherein the optical path length from the input port to the output port in the respective NXN number of optical paths is substantially the same.

6. (Cancelled)

7. (Cancelled)

8. (Currently Amended) ~~An optical switch as defined in claims 1 or 4~~ An optical switch provided with N number of input ports and N number of output ports (herein “N” is a plural number), comprising:

N number of first switching parts each having one input port of the N number of input ports, N number of first coupling ports, and a plurality of optical path switching elements;

N number of second switching parts each having one output port of the N number of output ports, N number of second coupling ports, and a plurality of optical path switching elements; and

N X N number of optical fibers connecting the first coupling ports and the second coupling ports,

wherein the differences between the maximum and the minimum in terms of the number of the optical path switching elements through which light passes in N X N number optical paths from the input port to the output port are equal to or less than 4, wherein each of the first switching parts comprises:

a first planar waveguide device having N number of first coupling optical waveguides and an input optical waveguide, each of the first coupling optical waveguides including a first coupling port, and the input optical waveguide including the input port and being formed so as to cross the first coupling optical waveguides;

N number of first reflection mirrors for reflecting an incident light signal from the input optical waveguide to the respective first coupling optical waveguides, the first reflection mirrors

being inserted respectively in trenches formed at the cross-points of the first coupling optical waveguides and the input optical waveguide; and first actuators driving the respective first reflection mirrors; and

each of the second switching parts comprises:

a second planar waveguide device having N number of second coupling optical waveguides and an output optical waveguide, each of the second coupling optical waveguides including a second coupling port, and the output optical waveguide including the output port and being formed so as to cross the second coupling optical waveguides;

N number of second reflection mirrors for reflecting an incident light signal from the second coupling optical waveguides toward the output optical waveguide, the second reflection mirrors being inserted respectively in trenches formed at the cross-points of the second coupling optical waveguides and the output optical waveguide; and

second actuators driving the respective second reflection mirrors.

9. (Currently Amended) An optical switch as defined in ~~claims~~ claim 8 or 11, wherein

the first and second reflection mirrors are fixed to cantilevers provided over the first and second planar waveguide devices, respectively; and

the first and second actuators have electrodes provided over the first and second planar waveguide devices, and means for generating electrostatic attraction between the electrodes and the cantilevers.

10. (Original) An optical switch as defined in claims 9, wherein the electrodes and the cantilevers are equipped with comb teeth parts disposed facing each other.

11. (New) An optical switch provided with N number of input ports and N number of output ports (herein “N” is a plural number), comprising:

N number of first switching parts each having one input port of the N number of input ports and N number of first coupling ports;

N number of second switching parts each having one output port of the N number of output ports, N number of second coupling ports; and

N X N number of optical fibers connecting the first coupling ports and the second coupling ports, wherein

P_{li} each of half the number or more of first coupling ports of the N X N first coupling ports are connected with second coupling ports P_{2(N+1-i)}, where P_{li} is a first coupling port corresponding to an optical path which comes in the “i”th shortest one in terms of the optical path length between the input port and one of the first coupling ports in each first switching part, and P_{2j} is a second coupling port corresponding to the “j”th shortest one in terms of the optical path length between the output port and one of the second coupling ports in each second switching part,

wherein each of the first switching parts comprises:

a first planar waveguide device having N number of first coupling optical waveguides and an input optical waveguide, each of the first coupling optical waveguides including a first coupling port, and the input optical waveguide including the input port and being formed so as to cross the first coupling optical waveguides;

N number of first reflection mirrors for reflecting an incident light signal from the input optical waveguide to the respective first coupling optical waveguides, the first reflection mirrors being inserted respectively in trenches formed at the cross-points of the first coupling optical waveguide and the input optical waveguide; and first actuators driving the respective first reflection mirrors; and

each of the second switching parts comprises:

a second planar waveguide device having N number of second coupling optical waveguides and an output optical waveguide, each of the second coupling optical waveguides including a second coupling port, and the output optical waveguide including the output port and being formed so as to cross the second coupling optical waveguides;

N number of second reflection mirrors for reflecting an incident light signal from the second coupling optical waveguides toward the output optical waveguide, the second reflection mirrors being inserted respectively in trenches formed at the cross-points of the second coupling optical waveguides and the output optical waveguide; and

second actuators driving the respective second reflection mirrors.